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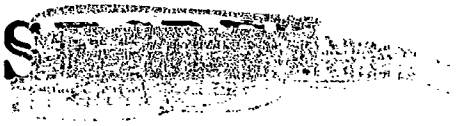

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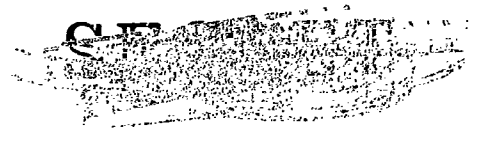

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Issue No. 28
31 May 1962

PROJECT QUICK CHECK MONTHLY PROGRESS REPORT

(TITLE UNCLASSIFIED)

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FPR-4005
Issue No. 28
31 May 1962

PROJECT QUICK CHECK MONTHLY PROGRESS REPORT

(Title Unclassified)

Submitted Under
Contract AF33(600)-40367

This report covers the period of 1 May through 31 May 1962.

APPROVED BY:

L. C. Sonntag

N. A. Clanton

GENERAL DYNAMICS/FORT WORTH
A Division of General Dynamics Corporation
Fort Worth, Texas

SECRET

F O R E W O R D

Project Quick Check is an All Weather Reconnaissance and Charting System which will provide timely intelligence and and targeting information for missile and manned, high-speed systems under all weather conditions.

This report is the twenty-eighth issue in a series of monthly progress reports on the progress made by General Dynamics/Fort Worth on Project Quick Check, Contract AF33(600)-40367. The work accomplished during the month of May 1962 is described in the following pages.

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SUMMARY

On 19 May B-58 Airplane No. 9 was returned to flight status after having been grounded since 13 April 1962. T.O. 1B-58-919 grounded the aircraft and T.O. 1B-58-920, which required extensive rework of the flight control system, had to be accomplished before the airplane could be released for flight. This tech order also required that the autopilot be disconnected for flight; however, a special waiver was obtained to permit use of the autopilot in aircraft No. 9 since it is required to accomplish Quick Check missions.

The AAR-19 System was removed from the aircraft during this period and engineering work was initiated to replace it with the HRB-Singer Company's Reconofax VI Infrared System. Simultaneously with the authority for this change the flight test program was extended for two additional months or through 8 August 1962.

F L I G H T T E S T I N G

No flights were made early in May because of the grounding of all B-58 aircraft by Technical Order No. 1B-58-919. On 9 May, Technical Order No. 1B-58-920 was issued which outlined rework to the Flight Control System necessary to effect release of grounding of the aircraft. This rework was accomplished and the airplane was released for flight on 18 May.

Flight No. 20 was made on 19 May for a duration of 1 hour and 25 minutes. Objectives of the flight were: to perform airplane shakedown tests after rework to the Flight Control System per T.O. 1B-58-920 and replacement of No. 1 engine; to conduct stability and control runs at Mach 1.8; and to operate the Quick Check equipment over targets in the local area.

Airplane shakedown checks were made satisfactorily, and the stability and control runs were completed at Mach 1.8. Difficulties were experienced, however, with the Quick Check systems. Eleven minutes after take-off a computer "dump" occurred in the N3A Navigation System. Startracking was lost and stabilization was unsatisfactory for the remainder of the flight. No valid mapping data were obtained from the APQ-77 and APS-73 radars because of the N3A malfunction; however, useable target information was displayed on the APQ-77 monitor scope. The F-415 camera was inoperative throughout the flight. Other systems appeared to operate satisfactorily.

The next flight was scheduled for 24 May. Planned interim work included checks of the test systems to correct flight discrepancies and a yaw damper malfunction in the Flight Control System. These items were cleared and the airplane was released for flight on 24 May.

Flight No. 21 was made on 25 May for a duration of 5 hours and 55 minutes. Acceptable Quick Check mapping data were recorded over a route from Fort Worth to Sayre, Oklahoma to Denver, Colorado to the Malmstrom AFB, Montana area and return on a parallel route to Fort Worth.

The N3A Navigation System was operated in the inertial mode for take-off because of cloud cover. After take-off, attempts were made to acquire stars but none were acquired then or later. The system was operated in the Doppler-Inertial mode with position corrections being made with the CORDIC equipment to minimize error build-up.

Good mapping data were obtained on all channels of the APS-73 except Channel No. 4. APQ-77 radar operation was satisfactory in all modes. All other Quick Check systems operated satisfactorily.

Post flight checks of the N3A System revealed a defective gyro. This gyro was changed and a calibration run was accomplished.

MAJOR SYSTEMS

AUXILIARY DATA RECORDING SYSTEM

The system continued to operate satisfactorily throughout the month. On Flight No. 20, a total of 153 data blocks were recorded without error and on Flight No. 21, 297 data blocks were recorded without error. The problem of extraneous ABLE time counts was caused by dirt on the tenths-of-seconds wheel of the ADR clock. The clock was cleaned.

ELECTRONIC RECONNAISSANCE SYSTEM (ABLE)

The ABLE system operated without failure on both flights in May. Flight No. 20 was a short local flight. ABLE recorded approximately 1.5 tracks of data with intercepts recorded from both frequency bands. During Flight No. 21 all eight tracks of tape were used and the recorder was stopped by the photo cells at the end of the tape. Recordings of intercepts were obtained from both frequency bands on each track. Intercepts from the above flights could not be correlated with known emitters because of lack of data reduction equipment.

F-415 CAMERA

The film broke during take-off on Flight No. 20 so data was not obtained. The cause of breakage has not been determined.

On Flight No. 21 pictures of good quality were obtained over clear areas, but 75 percent of the flight was made over scattered to complete cloud coverage. The camera performed without failure.

AAR-19 INFRARED SYSTEM

The AAR-19 Infrared System performed throughout Flight No. 20 without failure. Returns were fair, rivers being the only targets that came in very strong. Returns were not degraded at the Mach 1.8 speeds obtained on this flight.

The AAR-19 Infrared System performance on Flight No. 21 was made without failure. Good returns were obtained in the areas not covered by clouds. Terrain features were as good as any previously obtained by the AAR-19.

After Flight No. 21 the system was removed from the aircraft and will not be flown further in the Quick Check program.

RECONOFAX VI INFRARED SET

Engineering work is in progress to install an HRB-Singer Reconofax VI infrared system in the program. The system is to be delivered to GD/FW by 1 June and will be installed in time for Flight No. 23.

AN/APQ-77 RADAR SYSTEM

Flight No. 20, which was a shakedown flight after airplane rework, was flown on 19 May 1962. A low altitude run was made near the end of the flight.

There were no discrepancies noted during the post flight meeting; however, an examination of the film showed:

1. A strong interference pattern was present on the film much of the time during the flight.

2. In several cases film was double exposed. In one case no pictures were taken for an extended period.

The N3A became inaccurate soon after take-off, which degraded the radar performance. In anticipation of the low-altitude run, the manual tilt had been preadjusted; although the operator attempted to adjust tilt in flight, it was found that the best results were obtained in the automatic mode. A large STC correction was necessary before satisfactory pictures at low level could be obtained.

A check of the wiring, operation of the systems with the engines running, and injection of a long strong video pulse were made in an attempt to determine the cause of the interference. No definite cause has been determined since the system has not reproduced the problem on the ground.

The investigation of the camera problems included a check of the pulses from the antenna and changing two relays in the Control Box which could have caused the double exposures. The lack of pictures for an extended period were possibly due to a lack of a request signal from the N3A.

Flight No. 21 was flown on 25 May 1962 and a low-altitude run was made near the end of the flight.

There were no problems indicated in the post flight meeting. A check of the film revealed no system problems. The data were considered to be some of the best which have been obtained on this program.

AN/APS-73 RADAR SYSTEM

An N3A System computer "dumped" approximately 10 minutes after take-off on Flight No. 20, therefore no mapping data were obtained. However, a short run of signal film indicated a bad defocus on all four channels. The cause was determined to be a broken high voltage, stand-off insulator on CRT No. 3 HV lead. This caused intermittent arcing at the connection point and subsequent defocusing.

On Flight No. 21, all mapping was done in the clutterlock mode with all channels on the right-hand side. Magnification and sweep positions were unchanged from the previous flights. Specific areas of interest mapped were Altus AFB, Denver, and Malmstrom AFB.

Mapping was normal except during high drift angles and immediately preceding and following present position corrections when the aircraft was unstable. Camera No. 2 drive was rough and will be corrected. Channel No. 4 CRT defocused midway through the flight. The cause is either a gassy CRT or a high voltage problem such as corona. This problem will be investigated after the next flight.

At the termination end of the flight a low-altitude run was made at 5,000 feet. A modification had been made to the system to enable the operator to manually switch out the normal sweep delay so that mapping was started approximately 6.5 miles sooner on all channels. Therefore, near range on Channel No. 1 was at 1.5 miles. Also, receiver gain controls were installed in the control monitor so that the operator could change gain during flight. These controls give an approximate range of ±8 db from a fixed gain.

Figure 1 is of the Denver, Colorado area, showing airfields, tank farms and mountains near Boulder, Colorado. This figure was made from Channel No. 1, Flight No. 21, at an altitude of 27,000 feet and a ground speed of 525 knots.

Figure 2, which was made from Channel No. 4, is also of the Denver area, showing a strip of various kinds of terrains.

Figure 3 is of the local area from Channel No. 1 made at an altitude of 5,400 feet and a ground speed of 418 knots.

The Frederick, Oklahoma area can be seen in Figure 4. This picture was taken from Flight No. 18 at an altitude of 38,500 feet and a ground speed of 740 knots. It shows the mapping capability at a supersonic speed.

N3A NAVIGATION SYSTEM

Lab System

The lab system was given a complete checkout. It was found that the bubble levels were too sensitive, which could be caused by a loss of fluid in the bubble levels. An inertial mode check was made and operation was good. An attempt was made to track stars; however, clouds prevented a good checkout.

Flight No. 20

Take-off was made in the SI mode on Flight No. 20, after only a few minutes of startracking. The system operation was good for approximately 10 minutes at which time a computer "NO-GO" indication was displayed. The computer was off (No-Go) for at least one minute, then came back on and operated normally for the rest of the flight. Because of the computer "No-Go" the platform was torqued off in vertical and azimuth. Startracking was lost and large ground speed and ground track error resulted. The system was flown in the DI mode for the remainder of the flight.

Figure 1. Denver Area Showing Stapleton Field, Lowry AFB, and Rocky Mountain Arsenal. 27,000 feet, 525 knots, Channel 1

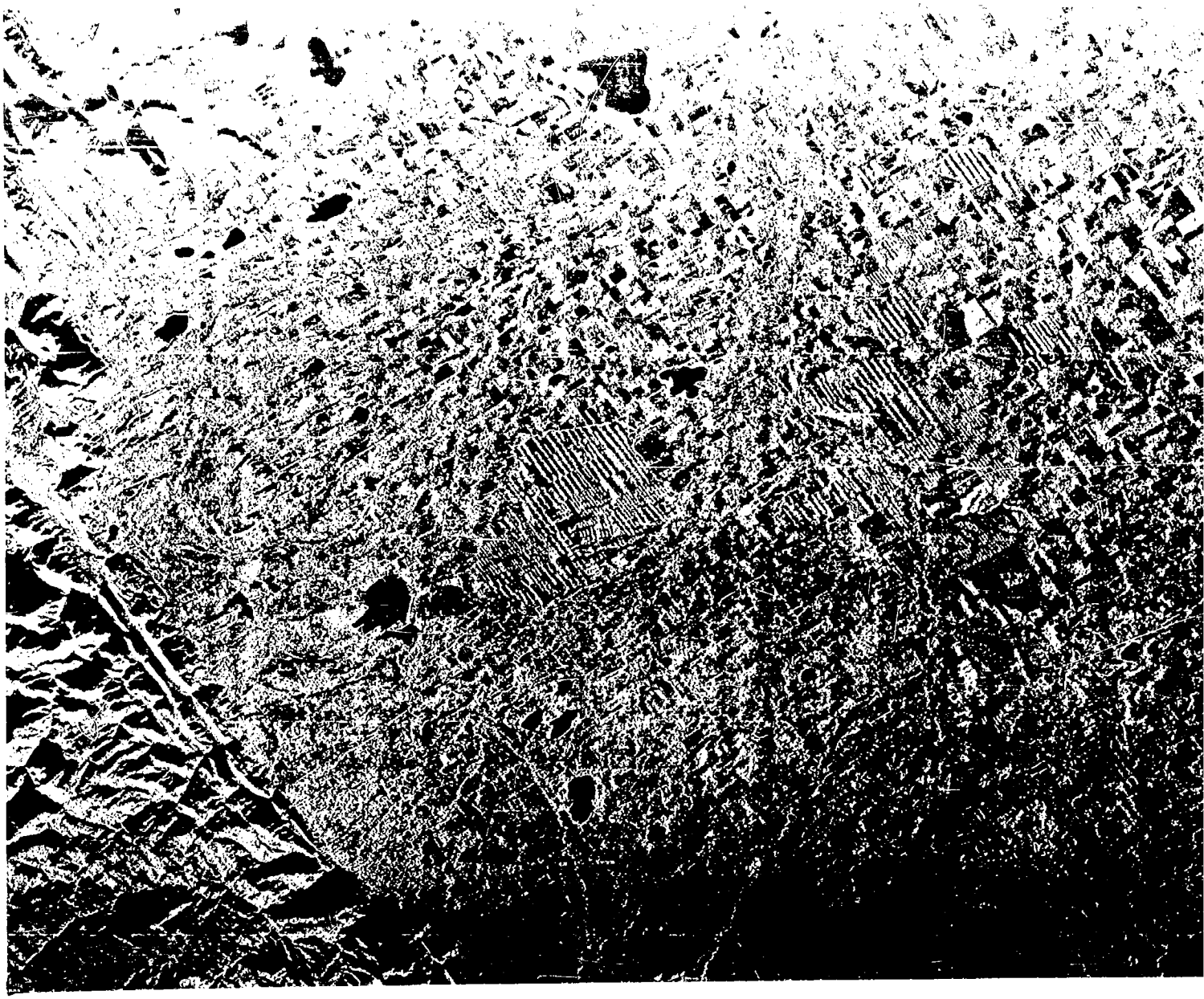

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Figure 2. Denver Area Showing a Strip of Various Types of Terrain, Including Mountains, Plowed Fields and Flat Areas. 27,000 feet, 525 knots, Channel 4

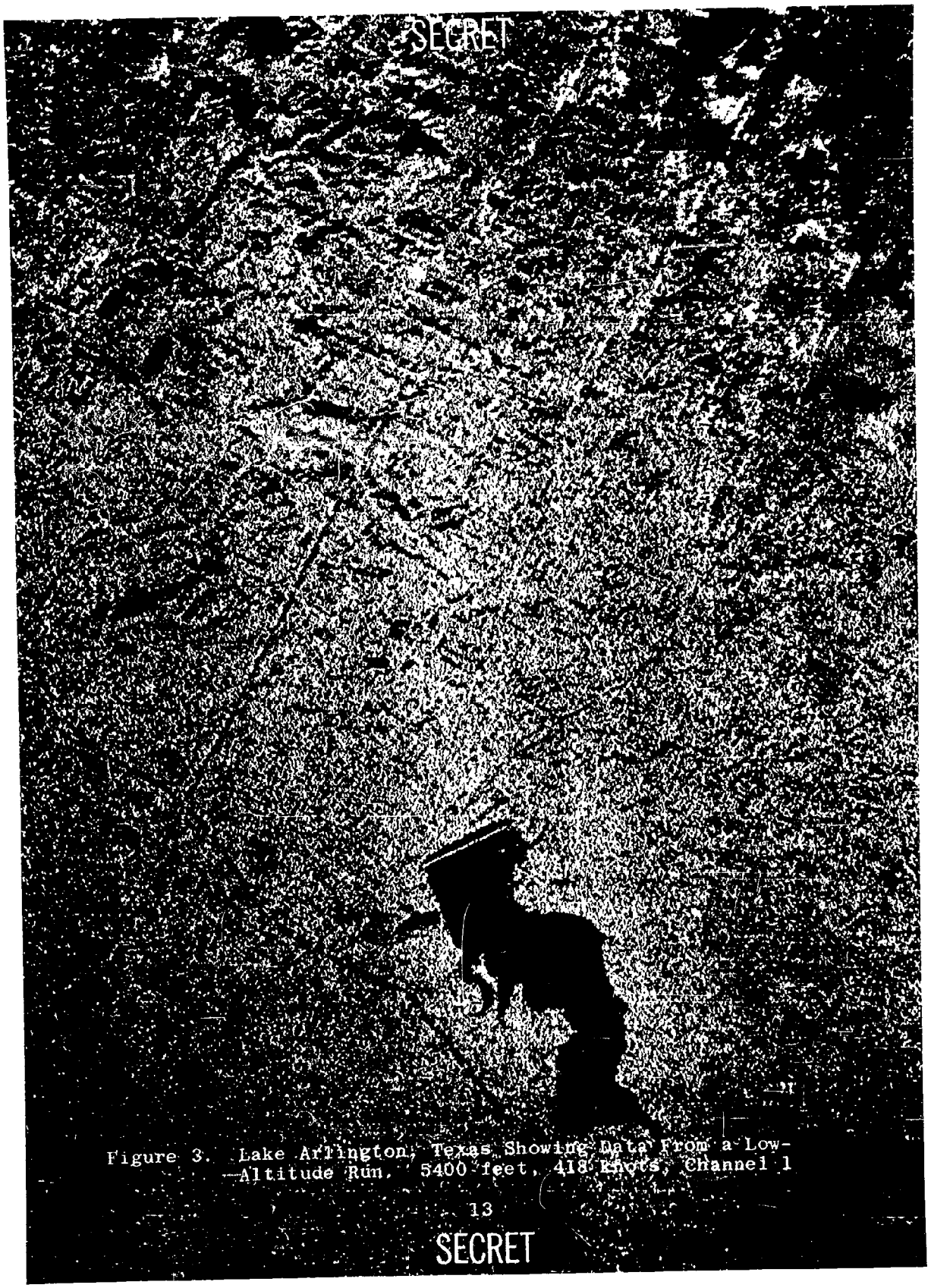


Figure 3. Lake Arlington, Texas Showing Data From a Low-Altitude Run, 5400 feet, 418 Knots, Channel 1

Figure 4. Frederick, Oklahoma and Altus AFB. 38,000 feet, 740 knots, Supersonic Run

Operation of associated equipments during the flight was as follows:

Doppler Radar	Good
Data Conversion	Good
Autopilot Tie-In	Good
In-Flight Printer	Good

Examination of the system and system operation after the flight indicated that no malfunction occurred in the N3A equipment. Discussions with air-conditioning personnel indicate that a minimum flow (approximately zero flow) condition can exist for short periods (several minutes) after take-off. Tests in the Quick Check Laboratory indicate that the computer will dump after approximately two minutes of zero airflow when it has been at operation conditions (air inlet 3-3/4 pounds per minute at 73°F). A thermocouple was installed in the computer to aid the crew in detecting a computer overheat condition before the computer becomes hot enough to "dump."

This was the first flight in which the new star search mode was available for use. During the flight, star search was used and a pulse was received at least one time.

Flight No. 21

On Flight No. 21 the N3A Navigation System was placed in the SI mode for approximately 30 minutes. Because of the clouds moving in the area, the system was placed in the Inertial mode. After the clouds cleared, the system was placed in the SI mode but stars were not acquired. Doppler was put into the system with small velocity errors indicated. Present position corrections were made throughout the flight while velocity errors were small but tracking was not resumed. The operator reported that the system indicated star test had been passed (4 pulses in 0110) after making present position corrections, but no additional pulses were received. Navigation was poor throughout the flight. A tracking station in Canada indicated a velocity error of approximately 25 knots. At this time the delta values were indicating system velocity errors of 10 to 20 feet per second.

Operation of associated equipments during the flight was as follows:

Doppler Radar	Good
Data Conversion	Good
Autopilot Tie-In	Good
In-Flight Printer	Good

The new flight tape (#22 - 5X) was used on this flight.

Temperature stabilization of the platform was still erratic after the flight. The crew reported that the gyro temperature ran at 125°F (normally 120°-121°) and the velocity meter ran at 101°F (normally 104°-105°). This indicated that the gyro being monitored was running too hot. This would subsequently cause the other gyro and the velocity meters to run too cold. The "X"-gyro was replaced and the temperature stabilized to 122°-123°, while the velocity meter stabilized to 104°F. The difference in gyro temperature from the previous normal is probably due to the difference in the thermocouple used. Tape No. 16 (gyro bias and scale factor) was run for the "X" and "Y" gyro biases and scale factors.

SYSTEMS INTEGRATION

Equipment Environment and Cooling

An automatic computer dump of the N3A VERDAN occurred on Quick-Check Flight No. 20 during initial climb to cruise conditions. The VERDAN returned to normal operation shortly thereafter. One possible cause of the computer dump and subsequent return to normal operation is a short term lack of cooling caused by low cabin airflows during cabin temperature stabilization. This could occur if the VERDAN temperature rise rate during reduced cooling were faster than the electronic package simulator ("Nellie") temperature rise rate. The electronic package simulator has control over cabin airflow when it becomes overheated.

A short test was performed to determine the critical part temperature rise rate of VERDAN. Air was supplied to VERDAN at various rates until temperature stabilization was obtained. The flow was then decreased to some arbitrary low value and the time to overheat was measured. The most significant run was one in which 3.75 pounds per minute at 72°F air was supplied. The instrumented transistor stabilized at 101°F. This was the predicted steady-state cooling flow to VERDAN in the Quick-Check airplane. After stabilization the flow was reduced to zero. The instrumented power transistor rose to 135°F and automatic power removal occurred after 2 minutes and 15 seconds. This period of time is of the same order of magnitude required for "Nellie" to correct a low-flow condition if it starts from an initially over-cooled state. This indicates that a temporary VERDAN overheat condition could have been the cause of the Flight No. 20 computer dump.

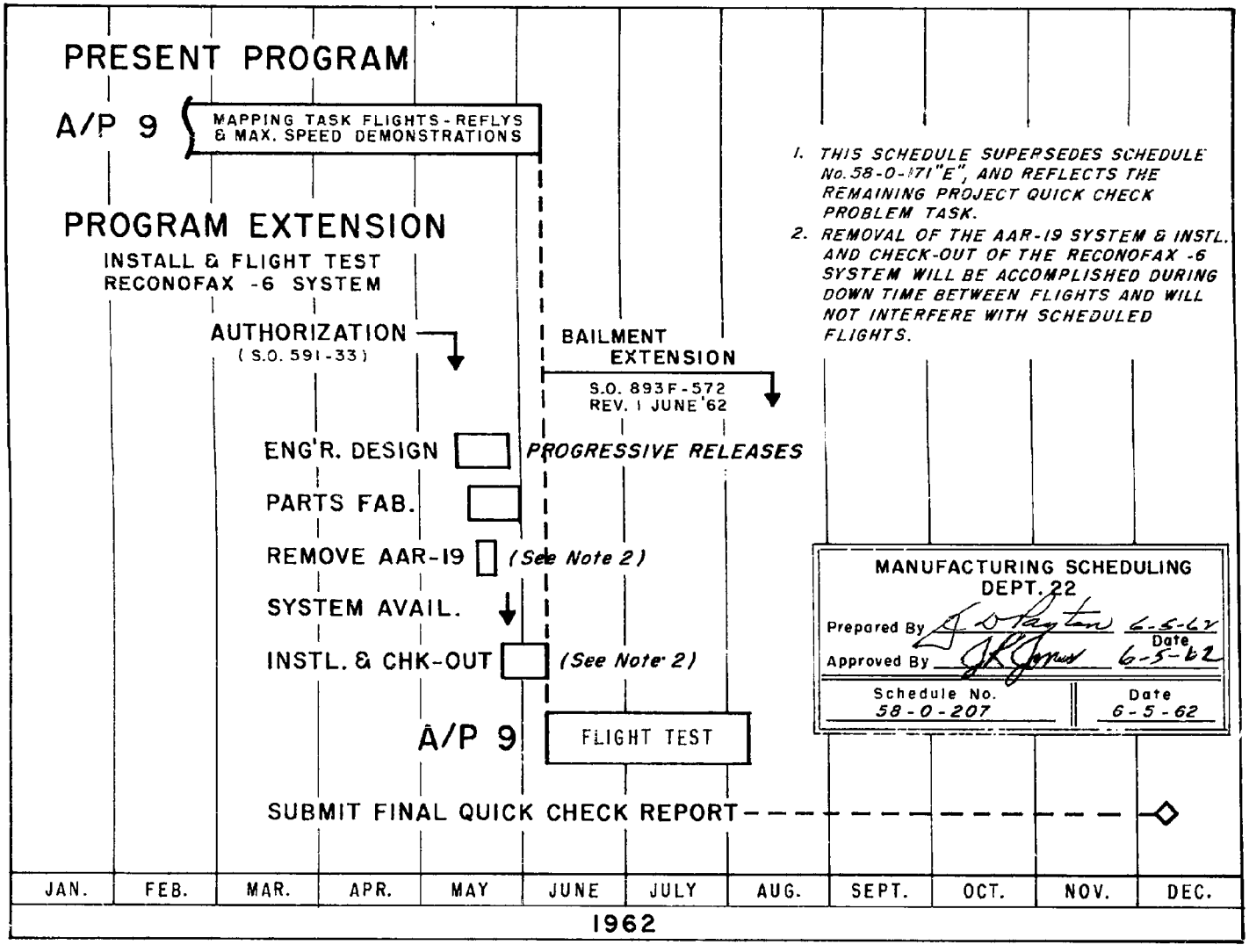
On Flight No. 20 the "Nellie" amplifier was not turned on until immediately prior to take-off. On Flight No. 21 the Nellie amplifier was turned on while the airplane was in the run station. "Nellie" was therefore fully warmed up and near its control temperature band at take-off. During climb the VERDAN power transistor rose from 102°F to 112°F and then returned to and stabilized at 102°F, indicating that "Nellie" had come into control and increased flow long before dump temperature was reached. The standard flight procedure will therefore, in the future, ensure that the Nellie amplifier is turned on before beginning taxi.

Fixtaking Tie-In Equipment

On Flight No. 20 the fixtaking tie-in equipment was not functioning entirely satisfactorily because of broken wires existing in the aircraft harness J601-1 and 2. After the flight the cables were repaired, and since then the fixtaking tie-in equipment has operated properly.

The fixtaking tie-in equipment was used extensively during Flight No. 21. The success of the flight can well be attributed to the assistance CORDIC rendered to the N3A System. Thirty minutes after takeoff, CORDIC was used to perform a 6.4 nautical mile present-position correction to the N3A Navigation System. After this correction and each of the six ensuing corrections, the second station operator reported that CORDIC positioned the N3A System so accurately that star pulses were obtained on the N3A monitor panel.

PROJECT QUICK CHECK PROGRAM SCHEDULE



DEPARTMENT OF THE AIR FORCE
AIR FORCE RESEARCH LABORATORY
WRIGHT-PATTERSON AIR FORCE BASE OHIO 45433

MAY 2 1 2003

MEMORANDUM FOR: 11 CS/SCSL (MDR)

FROM: AFRL/SN
2241 Avionics Circle
Sensors Directorate
Wright-Patterson AFB OH 45433-7320

SUBJECT: Mandatory Declassification Review (MDR) Request, Case 02-MDR-047

1. Case Package 02-MDR-047 has been reviewed by our RF Sensor Technology Division and the recommendation is to change the classification from Confidential to Unclassified.

2. If you have any questions on this matter, please contact Mr. Mark Longbrake, AFRL/SNR, (937) 255-5218, x4264.

Attachment
Case 02-MDR-047

DONALD W. HANSON, SES
Director, Sensors

This memorandum is unclassified when separated from classified enclosures.

[redacted]
CONFIDENTIAL

DEPARTMENT OF THE AIR FORCE
11TH WING

2 March 2005

11 CS/SCS (MDR)
1000 Air Force Pentagon
Washington DC 20330-1000

Mr. Jason H. Gart
15440 N. 71st Street
Apartment 301
Scottsdale, Arizona 85254-8101

Dear Mr. Gart

This is in response to your letter dated 1 November 2004, letter of appeal, requesting public release of the following documents:

Project Quick Check (AD345317)

Project Quick Check (AD345045)

The documents were reviewed by the appropriate Air Force activities and it has been determined the Defense Technical Information Center (DTIC) documents **can** be released to the public:

This completes your request under number 02-MDR-047. If we can be of further assistance, please contact the undersigned at 703-696-7265.

Sincerely

JOANNE MCLEAN
Mandatory Declassification Review
Manager

cc: DTIC